

## REFINEMENT OF THE ROADWAY SEGMENT PEDESTRIAN LEVEL OF SERVICE

### PROBLEM STATEMENT

Within the State of Florida and around the country, transportation agencies are attempting to improve the overall transportation system by effectively leveraging a multitude of transportation modes (e.g., air, auto, rail). Pedestrian travel is one of these modes. As such, the Florida Department of Transportation developed a *Pedestrian Level of Service (LOS) Model*<sup>1</sup>, an effort which included conducting field surveys to assess the quality of existing roadside environments. Afterwards, researchers found that a few unevaluated factors within the roadside environment appeared to have influenced the participants' responses to the surveys. Specifically, survey participant responses seemed to be affected by the presence of other people within the sidewalk or roadside environment and by the presence of structures and buildings proximate to the right-of-way.

Consequently, researchers hypothesized that pedestrians were more comfortable when other pedestrians were present and when the sidewalks were landscaped and bordered by building fronts (e.g., office/store fronts) rather than alternative environments, such as open parking lots or buildings set further back. In an attempt to better understand how to design a pedestrian friendly environment, FDOT undertook additional research to investigate these particular factors.

### OBJECTIVES

To test these previously unevaluated relationships, researchers utilized the pedestrian response database from the original "Walk for Science 2000" course in Pensacola, Florida in addition to data collected approximately two years following the event. Using these data, the research team performed Pearson Correlation and step-wise regression analyses to test the two hypotheses. The team also evaluated the ranges of the new variables to scrutinize the reliability of the results of the analyses.

The primary objective of this research was to investigate the expansion of the *Pedestrian LOS Model* to incorporate the pedestrian flow rate and the presence of structures and buildings proximate to the right-of-way. A secondary objective of this research was to establish the foundation for a preliminary approach to integrating the pedestrian level of service methodology as outlined in the Highway Capacity Manual (Fruin methodology) with FDOT's current roadway segment pedestrian LOS methodology.

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<sup>1</sup> Landis, B.W., Vattikuti, V.R., Ottenberg, R.M., McLeod, D.S., and Guttenplan, M. Modeling The Roadside Walking Environment: Pedestrian Level Of Service. In *Transportation Research Record 1773*, TRB, National Research Council, Washington, D.C., 2001, pp. 82-88.

## FINDINGS AND CONCLUSIONS

The research team tested two hypotheses in this project. The first hypothesis was that, within some ranges of pedestrian volumes, the presence of other pedestrians would positively influence the respondents' perceptions of roadside conditions. The second hypothesis was that, in situations where pedestrian volumes are low, the presence of buildings, especially tall buildings, immediately adjacent to the street right-of-way would negatively affect pedestrians' perception of roadside conditions.

The first hypothesis was tested by using a step-wise regression of the pedestrian perceptions (dependent variable) with respect to the 15-minute pedestrian volume (independent variable) for the approximate time that pedestrians walked each segment. This analysis resulted in a t-statistic of  $-0.421$ , which means that a statistically reliable conclusion could not be drawn from this data set. Subsequent analysis was conducted using segment with an average of two pedestrians or more for a 15-minute period and re-regressing the *Pedestrian Level of Service Model* terms with the remaining variables. The additional analysis revealed that the presence of other pedestrians has an affect on a person's perceptions of safety at relatively low pedestrian volumes; however, reliable conclusions cannot be made from the existing data because it does not contain a wide enough range of pedestrian volumes. The highest volume of pedestrians on any segment was 28 in a 15-minute period, or 0.3 pedestrians/min/ft on an effective sidewalk width of 6 feet. Under the Fruin methodology, the pedestrian flow rate equivalent to LOS "A" is 0 to 5 pedestrians/min/ft. Thus, the data set only covers a tiny portion of the full range of pedestrian flow rates considered under the Fruin methodology in the Highway Capacity Manual.

To test the second hypothesis, the team conducted step-wise regression of the participants' perceptions (dependent variable) with respect to building height and building setback (independent variable). The step-wise regression of participants' perceptions with respect to building height concluded that it was not statistically significant, while the regression with respect to building setback could not result in a statistically reliable conclusion.

The original *Pedestrian Level of Service Model* data set was not gathered for the purpose of evaluating a Fruin-type model of LOS, so it is not unusual that the data could not support that extension. The observed evaluations of level of service would need to include a wider range of pedestrian volumes to more adequately reconcile the Roadside Pedestrian LOS Model with the Highway Capacity Manual Pedestrian LOS, which is based upon the Fruin model of pedestrian flow rate.

## BENEFITS

This research was intended to extend the original *Pedestrian Level of Service Model* to incorporate two additional variables into the measure: (1) the presence of other people within the sidewalk or roadside environment; and (2) the presence of structures and buildings proximate to the right-of-way. While the results were suggestive of the hypotheses proposed by the researchers, the lower-than-expected pedestrian volumes rendered them either inconclusive or unreliable using the existing data set. However, this study indicates the importance of

conducting additional research using other strategies, such as focus groups or surveys, and of conducting research in communities with a broader range of pedestrian volumes and other field conditions. This project is another step forward in the effort to better understand pedestrian perceptions of the level of service under various walking conditions.

This research team for this project consisted of Ruth Steiner, Principal Investigator, University of Florida, and Sprinkle Consulting, Inc. For more information on the project, contact Martin Guttenplan, Project Manager, at (850) 414-4906, [martin.guttenplan@dot.state.fl.us](mailto:martin.guttenplan@dot.state.fl.us).